

# PISA

## PISA 2015: A Sneak Preview

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9:30 – 10:30 a.m. (ET)

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# PISA 2015



- **Looking at school systems in 72 countries and economies**
- **Students assessed in **science**, mathematics, reading, collaborative problem-solving and financial literacy**
- **Results to be released on December 6**
- **Key issues:**
  - How far are we nurturing a generation of scientifically literate young people?
  - Are schools adequately preparing young people for adult life?
  - What kinds of learning environments do we find in high performing systems?
  - Can schools improve the futures of students from disadvantaged backgrounds?

# PISA 2015

A world map where countries are color-coded. OECD member countries are highlighted in a dark blue color, while other participating countries (partners) are highlighted in a lighter blue color. The rest of the world is shown in light gray. A horizontal line with a multi-colored gradient (red, yellow, green) runs across the map.

OECD  
Partners

# PISA in brief - 2015



## **In 2015, over half a million students...**

- representing 28 million 15-year-olds in 72 countries/economies

## **... took an internationally agreed 2-hour test...**

- Goes beyond testing whether students can reproduce what they were taught...  
... to assess students' capacity to extrapolate from what they know and creatively apply their knowledge in novel situations
- Total of 390 minutes of assessment material

## **... and responded to questions on...**

- their personal background, their schools, their well-being and their motivation

## **Parents, principals, teachers and system leaders provided data on:**

- school policies, practices, resources and institutional factors that help explain performance differences
- 89,000 parents, 93,000 teachers and 17,500 principals responded

# PISA in brief – key principles

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- **‘Crowd sourcing’ and collaboration**
  - PISA draws together leading expertise and institutions from participating countries to develop instruments and methodologies...  
... guided by governments on the basis of shared policy interests
- **Cross-national relevance and transferability of policy experiences**
  - Emphasis on validity across cultures, languages and systems
  - Frameworks built on well-structured conceptual understanding of academic disciplines and contextual factors
- **Triangulation across different stakeholder perspectives**
  - Comprehensive insights from students, parents, school principals and system-leaders
- **Advanced methods with different grain sizes**
  - A range of methods to adequately measure what young people know and can do: different grain sizes to serve different decision-making needs
  - Productive feedback to fuel improvement at every level of the system

# PISA in brief - Governance

Participating countries

PISA Governing Board

Design and development

International Subject Matter Expert Groups

OECD

International Technical Advisory Group

Project implementation

National subject matter groups

National project Managers

PISA International Consortium

National experts

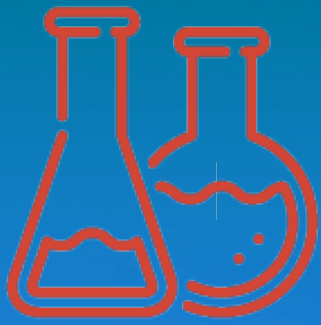


# Science in PISA

“the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen”

A scientifically literate person is willing to engage in reasoned discourse about science and technology





## Competencies

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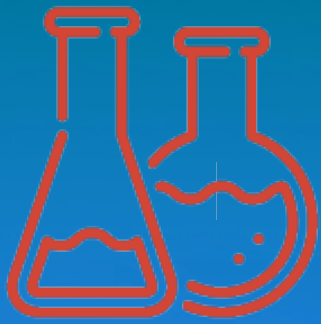
- Explain phenomena scientifically
  - Evaluate and design scientific enquiry
  - Interpret data and evidence scientifically
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Recognise, offer and evaluate explanations for a range of natural and technological phenomena

Describe and appraise scientific investigations and propose ways of addressing questions scientifically.

Analyse and evaluate data, claims and arguments in a variety of representations and draw appropriate scientific conclusions.





## Competencies

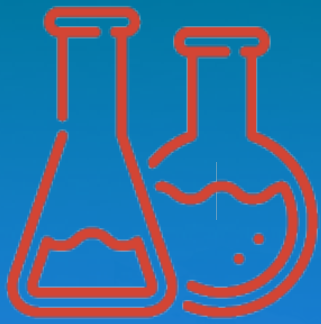
- Explain phenomena scientifically
- Evaluate and design scientific enquiry
- Interpret data and evidence scientifically

## Knowledge

- Content knowledge
- Knowledge of methodological procedures used in science
- Knowledge of the epistemic reasons and ideas used by scientists to justify their claims

Each of the scientific competencies requires content knowledge (knowledge of theories, explanatory ideas, information and facts), but also an understanding of how such knowledge has been derived (procedural knowledge) and of the nature of that knowledge (epistemic knowledge)

“Epistemic knowledge” reflects students’ capacity to think like a scientist and distinguish between observations, facts, hypotheses, models and theories



## Competencies

- Explain phenomena scientifically
- Evaluate and design scientific enquiry
- Interpret data and evidence scientifically

## Knowledge

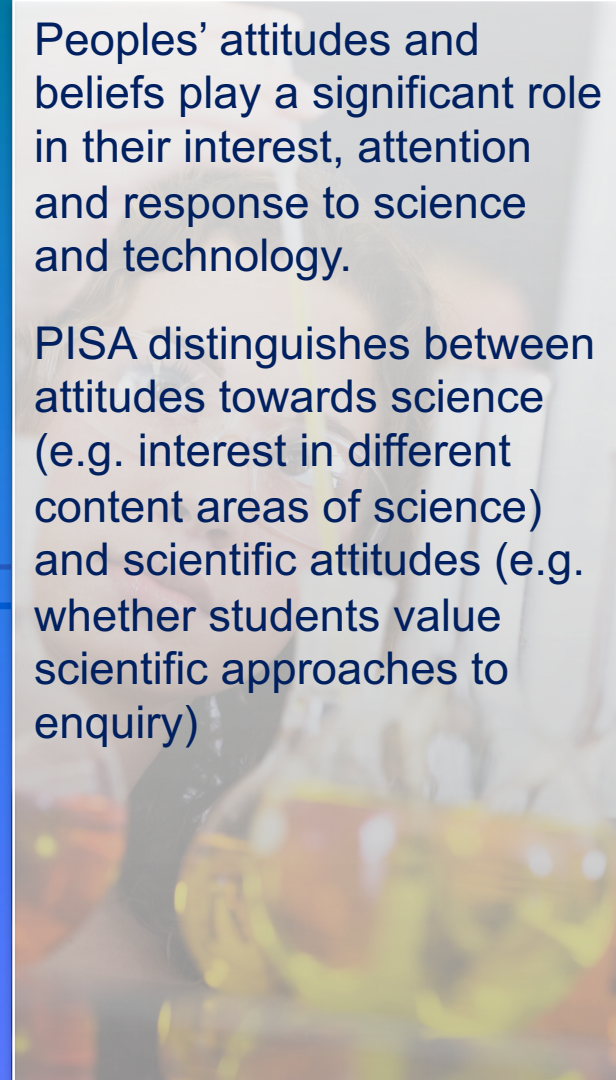
- Content knowledge
- Knowledge of methodological procedures used in science
- Knowledge of the epistemic reasons and ideas used by scientists to justify their claims

## Attitudes

- Attitudes to science
- Scientific attitudes

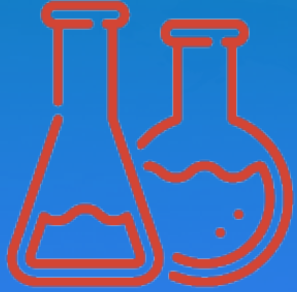
Peoples' attitudes and beliefs play a significant role in their interest, attention and response to science and technology.

PISA distinguishes between attitudes towards science (e.g. interest in different content areas of science) and scientific attitudes (e.g. whether students value scientific approaches to enquiry)



## Context

- Personal, local, global
- Current and historical



## Competencies

- Explain phenomena scientifically
- Evaluate and design scientific enquiry
- Interpret data and evidence scientifically

## Knowledge

- Content knowledge
- Knowledge of methodological procedures used in science
- Knowledge of the epistemic reasons and ideas used by scientists to justify their claims

## Attitudes

- Attitudes to science
- Scientific attitudes

Personal, local/national and global issues, both current and historical, which demand some understanding of science and technology



# The PISA tests

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- Science: 184 items (equivalent to 6 hours)
- Reading: 103 items (equivalent to 3 hours)
- Mathematics: 81 items (equivalent to 3 hours)
- Collaborative Problem Solving: 117 items (equivalent to 1.5 hours)
- Financial Literacy: 43 items (equivalent to 1 hour)
- Each student was given a two-hour combination of these tests

# PISA 2015: Take The Test

PISA 2015

## Sustainable Fish Farming

Question 1 / 4

Refer to the information below. Use drag and drop to answer the question.

The diagram shows a design for an experimental fish farm with three large tanks. Filtered salt water is pumped from the ocean before flowing from tank to tank until it is returned to the ocean. The primary goal of the fish farm is to grow common sole to be harvested in a sustainable way.

- **Common Sole:** The fish being farmed. Their preferred food is ragworms.

The following organisms will also be used in the farm:

- **Microalgae:** Microscopic organisms that only need light and nutrients to grow.
- **Ragworms:** Invertebrates that grow very rapidly on a diet of microalgae.
- **Shellfish:** Organisms that feed on microalgae and other small organisms in the water.
- **Marsh Grass:** Grasses that absorb nutrients and wastes from the water.

Water is returned to the ocean.

Water enters the farm from the ocean.

Nutrients are added to this tank.

Filter

Filter

Filter

Filter





Water is cleaned in this tank.

Fish are harvested from this tank.

Microalgae

Filters that allow only microalgae to move through the farm in the flow of water.

The researchers need to decide in which tank each organism should be placed. Drag and drop each of the organisms below to the appropriate tank above to ensure that the Common Sole is fed and that salt water is returned to the ocean unchanged. The microalgae are already in the correct tank.

 Common Sole	 Ragworms	 Shellfish	 Marsh Grass
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Drag Ragworms and Common Sole into Tank 2 and Marsh Grass and Shellfish into Tank 3

# PISA 2015: Take The Test

PISA 2015

## Running in Hot Weather

Question 1 / 6

**How to Run the Simulation**

Run the simulation to collect data based on the information below. Select from the drop-down menus to answer the question.

A runner runs for one hour on a hot, dry day (air temperature 40°C, air humidity of 20%). The runner does not drink any water.

What health danger does the runner encounter by running under these conditions?

The health danger that the runner encounters is .

This is shown by the  of the runner after a one-hour run.

Air Temperature (°C)     Air Humidity (%)     Drinking Water     No

**Run**

Air Temperature (°C)	Air Humidity (%)	Drinking Water	Sweat Volume (Litres)	Water Loss (%)	Body Temperature (°C)

Answer: Dehydration and water loss

# PISA 2015: Take The Test

PISA 2015

**Bird Migration**  
Question 1 / 5


Refer to "Bird Migration" on the right. Click on a choice to answer the question.

Most migratory birds gather in one area and then migrate in large groups rather than individually. This behaviour is a result of evolution. Which of the following is the best scientific explanation for the evolution of this behaviour in most migratory birds?

- Birds that migrated individually or in small groups were less likely to survive and have offspring.
- Birds that migrated individually or in small groups were more likely to find adequate food.
- Flying in large groups allowed other bird species to join the migration.
- Flying in large groups allowed each bird to have a better chance of finding a nesting site.

**BIRD MIGRATION**

Bird migration is a seasonal large-scale movement of birds to and from their breeding grounds. Every year volunteers count migrating birds at specific locations. Scientists capture some of the birds and tag their legs with a combination of coloured rings and flags. The scientists use sightings of tagged birds together with volunteers' counts to determine the migratory routes of birds.



**Answer:** the first option

**FACT? OR FICTION?**



# PISA Myths

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# PISA Myths

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“The top performers do well because they don’t include all of their students”

**OECD coverage of 15-year-olds: 89%, U.S. 84%**

# PISA Myths

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“It’s all about culture”

**Between 2000 and 2012, several education systems improved student performance by more than a school year**

# PISA Myths

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“The world is divided between rich and well-educated nations and poor and badly educated ones”

**Less than a quarter of the performance variation among OECD countries is explained by GDP/capita**

# PISA Myths

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**“Deprivation is destiny”**

**In 2012, the 10% most disadvantaged students in Shanghai reached similar math scores than the 10% most privileged American 15-year-olds**

# PISA Myths

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“Excellence is not compatible with equity”

**In 2012, there were education systems in Asia, Europe and North America with high and equitable learning outcomes**

# PISA Myths

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“Excellence requires selection”

**The highest-performing education systems are non-selective**

# PISA Myths

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“Educational quality and personalization is all about class size”

**The highest-performing education systems prioritize the quality of teachers over the size of classes**



# ALTERNATIVE: Lessons from PISA



## PISA 2015 Results: What Students Know and Can Do

STUDENT PERFORMANCE IN SCIENCE, READING,  
MATHEMATIC AND FINANCIAL LITERACY

VOLUME I



Programme for International Student Assessment



# ALTERNATIVE: Lessons from PISA

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- Develop a commitment to education and a conviction that all students can achieve at high levels
- Establish ambitious, focused and coherent standards that are aligned with instructional systems
- Develop capacity at the point of delivery and provide a work organisation in which teachers collaborate and develop their potential
- Invest in equity and align resources with challenges
- Complementing accountability to agents outside schools with accountability towards professional colleagues and parents
- Balancing local responsibility with a capable centre with authority to act
- Ensuring coherence of policies and practices and securing consistency of implementation
- Ensuring an outward orientation of the system to keep the system evolving, and to recognise challenges and potential future threats to current success

# Looking ahead: PISA 2018

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- **PISA for Development**
- **PISA for Schools**
- **Innovative Domain: Global Competence**
  - Global competence is the capacity to analyse global and intercultural issues critically and from multiple perspectives, to engage in open, appropriate and effective interactions with others from different backgrounds on the basis of a shared respect for human dignity and to take action for the sustainability and well-being of societies

